An iterative approach to local-PCA

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Abstract:
We introduce a greedy algorithm that works from coarse to fine by iteratively applying localized principal component analysis (PCA). The decision where and when to split or add new components is based on two antagonistic criteria. Firstly, the well known quadratic reconstruction error and secondly a measure for the homogeneity of the distribution. For the latter criterion, which we call “generation error”, we compared two different possible methods to assess if the data samples are distributed homogeneously. The proposed algorithm does not involve a costly multi-objective optimization to find a partition of the inputs. Further, the final number of local PCA units, as well as their individual dimensionality need not to be predefined. We demonstrate that the method can flexibly react to different intrinsic dimensionalities of the data.

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